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RESEARCH PAPER

Conservation of a Tropical Wet Semi-evergreen Forest Ecosystem by an Indigenous Community in the Bandarban Hill District of Bangladesh: The Role of Intervention

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Abstract Indigenous communities in the Chittagong Hill Tracts (CHT) of Bangladesh had been conserving small patch of forests, commonly called village common forests (VCFs), especially for drinking water and non-timber forest produce. The size of VCFs has been decreasing, due to increasing population and conversion of forests for shifting cultivation. To restore the degraded forest resources and conserve the forest ecosystems in the VCF of the CHT, an intervention was undertaken in Bandarban, Bangladesh by Arannayk Foundation, an organization established jointly by the Government of Bangladesh and the United States of America. A training program on leadership, organizational development and alternative income generating activities was implemented to build the capacity of the members of the VCF management committee. The impact of the interventions was measured at the end of third year. Incomes of VCF-dependent communities were found to increase with resultant reduction of their dependence on VCFs. The intervention encouraged women's participation in forest management and facilitated a written format of the constitution of the VCF management. The study identified that more training and awareness-raising activities are needed to ensure sustainability of the interventions. Mobilizing funds for the communities for sustainable alternative livelihoods was found effective. Appropriate compensation for conservation was found to make the restoration and conservation activities sustainable.

Keywords Village common forests (VCF) · Awareness campaign · Alternative livelihoods · Institutional change · Sustainability of VCF

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Introduction

Deforestation in tropical countries is a serious concern because of the resulting biodiversity loss, soil degradation and significant contribution to global climate change (Ehrhardt-Martinez et al. 2002). It also hampers livelihoods and cultural integrity, especially of indigenous communities (Culas 2007). Community-based forest management is generally considered as a principal strategy in nature conservation (Mannigel 2008). It becomes effective when appropriate incentives are offered, and roles are clearly defined, to the participants (Sawhney et al. 2007).

Bangladesh has been experiencing severe deforestation and forest degradation over the last 3–4 decades. During the period 2000–2005, the annual rate of deforestation in Bangladesh was about 2,000 ha or 0.3 % of the total forest area (FAO 2007). During last two to three decades, many plant and animal species have become extinct or endangered in Bangladesh (Chowdhury et al. 2009). A total of 40 inland mammals, 41 birds, 58 reptiles, 8 amphibians and 106 vascular plant species have reached at-risk status of varying magnitudes (IUCN 2000; Khan et al. 2001).

The Chittagong Hill Tracts (CHT), a hilly region located in the south-eastern corner of Bangladesh, is considered a centre of bio-cultural diversity because of its richness in natural resources and its cultural diversity (Halim et al. 2007). The CHT comprising of Rangamati, Khagrachari and Bandarban districts covers about 10 % of the total land area of Bangladesh and 76 % of the total hilly region of the country (Haque 2000). The low ranges in the CHT rise to an average height of about 600 m, running from north-east to south-west (Roy 2000). The region contains 73 % forest land, 15 % horticultural land and only 3 % terraced agricultural land (Rasul 2007). Various indigenous groups live in Bangladesh, with at least 12 distinct socio-linguistic groups in the CHT (Levene 1999). The culture and lifestyle of the indigenous groups are related to the forest resources, although it is difficult to pinpoint the effect of forest resources on the specific culture and lifestyle of various indigenous groups in the CHT.

Forest products are an integral component of the livelihoods of most of the rural households, and are a lower although not insignificant component of urban households in Bangladesh (Miah et al. 2012). The hilly areas of Chittagong, the CHT, Cox's Bazar and the Sylhet Forest divisions consist of hill forests, which are subject to severe degradation and deforestation due to overpopulation, reduction of fallow period in shifting cultivation and extension of agriculture (Salam et al. 1999) coupled with encroachment by settlers, poverty and lack of awareness on the value of forest ecosystems (HF 2011a). Lack of alternative income generation is also causing deforestation (Biswas and Choudhury 2007; Nath and Inoue 2009). The negligence of the customary use and the absence of management rights of the forests of the indigenous people in the CHT have also accelerated deforestation (Thapa and Rasul 2006). The village common forests or Mouza reserve[1] in the CHT come under the Unclassed State Forests[2] (Khisa et al. 2006). The VCF are rich in forest

[1] Mouza reserve or Mouza forests in the CHT of Bangladesh are simultaneously used as Village Common Forests (VCFs).

[2] Unclassed State Forests are not classed as forests by the Bangladesh Forest Department. This forest land is under the jurisdiction of Ministry of Land of Bangladesh.

biodiversity compared to the government-owned reserve forests, with effective community-based management taking place under customary rules and regulations (Halim and Roy 2006; Jashimuddin and Inoue 2012). During the recent past, the VCF have been subject to deforestation and forest degradation (Tiwari 2003; Rahman 2005; Halim and Roy 2006).

The indigenous communities living in the Chimbuk Belt have been managing VCFs of about 400 ha since 1955, mainly for water and non-timber forest products (HF 2011a). Due to increase in population in the area and conversion of some land to shifting cultivation, the floral diversity in the Chimbuk Belt is under threat (HF 2011a). A first intervention to combat the deforestation in the CHT—the Upland Settlement Project (USP) implemented by the Chittagong Hill Tracts Development Board (CHTDB) commenced in 1985 and ended in 2007—is positively influencing project participants to give up shifting cultivation and adopt soil conservation agroforestry practices (Nath and Inoue 2008). The forest coverage also was reported to have increased in the project villages. However, there were few participants and the participants adopting agroforestry practices ceased these practices after a few years. To restore the degraded forest resources and conserve the forest ecosystems in the VCF, an intervention has been undertaken since 2009 amidst the traditional practice of the indigenous forest management in Bandarban, Bangladesh. The present study examines the outcomes of the intervention on capacity building of the indigenous community to restore the forest resources.

The Study Area and Intervention Measures

The Arannayk Foundation (AF), also called the Bangladesh Tropical Forest Conservation Foundation, was established jointly by the Government of Bangladesh and the United States of America in 2003 under the provisions of the US *Tropical Forest Act 1998*. It intervened in the VCF activities in Bandarban by extending support to two local non-governmental organizations (NGOs),[3] namely the Humanitarian Foundation (HF) and the Tahzingdong for promoting VCF conservation using a scientific approach. The HF are working in the Chimbuk Belt for the Mro tribe and the Tahzingdong in the Rowangchari for the Marma tribe.

The Chimbuk Belt in the Bandarban district of the CHT is an important biodiversity hotspot covering the tropical wet mixed-forest ecosystem. The rich diversity in flora and fauna in the Chimbuk Belt form a unique forest ecosystem with numerous fountains and streams, providing a nature-dependent livelihood for the indigenous communities (HF 2011b). The Mro, Khumi and Bawm indigenous communities live inside this forest. The richness of floral diversity and their high density per unit of area in the hilly region is used to provide drinking water through numerous fountains and streams (Laurance 2007; Paoli et al. 2010).

The project entitled 'Indigenous community based sustainable management of Chimbuk Hill forest in Bandarban hill district' has promoted organizational

[3] The Humanitarian Foundation and Tahzingdong are two NGOs working for environmental development at local level in Bandarban, Bangladesh.

strengthening of the communities living in and around the VCF, improving the technical skill of VCF management and providing alternative livelihood support to reduce their dependence on forests.

To study the interventions, the VCF in Kapropara village from Soroui union[4] of Lama Upazila and the VCF in Korangpara village from Galangaa union from Ruma Upazila were both incorporated. The Mro ethnic community members were the only inhabitants in both the villages. Kapropara village included 34 households with 274 people managing 80 ha of VCF of which VCF customary committee started from 1976. Korangpara village included 28 households with 184 people managing 40 ha in the VCF area with the VCF committee has established in since 1955.

The interventions included: identification of forest dependent communities and organizing them into group; creating community awareness on forest ecosystem and biodiversity; leadership training; technical training to the VCF members on forest conservation and natural resource management; facilitating community-based savings and credit; facilitating household income plans to conduct alternative income generating activities (AIGAs); providing training to the VCF members on AIGAs; and providing revolving funds to the VCF members for AIGAs. The major objectives of the interventions were restoration of the forest resources and development of an institutional mechanism for conservation and sustainability of the VCF.

Before the intervention, there were four members of Kapropara and 12 for Korangpara in the customary VCF committee. The committee met only when there was urgent need for some cash to celebrate any festival. They used to meet the cash requirement from selling a few trees from the VCF. In both locations, the customary committee makes the decision and community members follow it. The management of the VCFs in both Kapropara and Korangpara faced problems originating from outsiders. Outsiders create indirect pressures on VCF members to sell trees and bamboo. In addition to this, considering the money making potential of the natural beauty of the area, government and private tour operators developed infrastructure partially destroying the VCF.

Older trees from the VCFs were sold at various occasions by the customary committee. Due to population pressure, the size of VCFs was reduced. However, the existing VCF was found rich in flora and fauna compared to neighbouring degraded forests. Commonly observed plant species in both of the VCFs are *Anacardium occidentale, Artabortys uncinatus, Holarrhena floribunda, Colocasia nymphaefolia, Calamus guruba, Livistonia rotundifolia, Bixa orellana* and *Cordia myxa* (Jashimuddin and Inoue 2012). Frequently found wild animals include *Muntiacus muntjak, Sus scrofa, Rana tigrina, Rana bimaculatus, Python reticulates, Varanus benghalensis, Buceros bicornis* and *Passer molanus* (Chowdhury et al. 2007).

Research Method

The study was conducted in the selected VCFs (Kapropara and Korangpara) where an organization supported the communities to improve biodiversity conservation and livelihoods of VCF-dependent communities in order to reduce their direct

[4] Union is the local government unit under Upazila (sub-district), and consists of villages.

dependence on forest resources from the VCF. In both the areas, the ethnic group was Mro. The study was conducted during October to December 2011. The selection of indigenous communities and the study areas was thus purposive, to investigate the impact of the interventions on the traditional management of the VCFs on forest conservation.

The study incorporated reviewing the baseline survey conducted in 2009 (reported by Jashimuddin 2010), project documents, annual progress reports and a project completion report; visiting the project sites and holding focus group discussions (FGD) with the project staff, project participants, community leaders and other stakeholders; and assessing the achievement of the projects compared with the set objectives, from both the written report and field observations.

A reconnaissance survey was carried out to gain an idea of the overall impact of the intervention on forest conservation in the study area before collecting the final data. This survey revealed that the intervention had a positive impact both on forest conservation and on the incomes of VCF members. The project documents were collected from both the AF, Dhaka and the HF, Bandarban. The Mro community and the corresponding VCFs were located with the aid of crews provided by the HF. While visiting the VCFs, a team including two local members of the Mro tribe, two office staff members of the HF and an expert ondendrology accompanied the survey team.

To ascertain the impacts of the alternative livelihood activities, a household survey was conducted, with random samples of 16 households from Kapropara village and 15 from Korangpara village. The samples covered about 50 % of all the households of the Mro community in the study area. The socio-economic information provided by the households was cross-checked with FGDs from both Kapropara and Korangpara. The FGDs were composed of the headman and other committee members of the staff of local NGOs, religious leaders and local school teachers. The FGDs in Kapropara and Korangpara were composed of 25 and 23 persons, respectively.

The project documents including the latest progress report were compared with the baseline report to confirm the impacts of AIGAs. The socio-economic data were compiled and analyzed using the Microsoft Office Excel 2007 and SPSS Statistics 17.0. The income data[5] were grouped according to type of AIGA to rank the potential income generating activities, and changes over time in their relative importance. The restoration of the degraded VCF was assessed in terms of the inventory of planted seedlings of rare and endangered tree species and their survival rates.

Results and Discussion

Awareness Raising and Alternative Livelihood Programs

Through project intervention, the VCF executive committee members used to hold monthly meeting, while before project intervention they only met once a year or

[5] The income data were collected in Bangladesh currency. The national currency of Bangladesh is the Taka (tk); on average during the study period, October to December 2011, US$ 1 = tk 80.

when there was need for generating cash for celebrating festivals. With monthly meetings, they could monitor their VCF and observe changes arising from the various interventions. They also discussed social problems and problems in VCF conservation. This has created greater awareness of conservation of the VCF and the services it provides for livelihood improvement. The NGO used the monthly meeting of VCF Committee as a training opportunity to create awareness on the conservation of VCF as well as for organizational and technical capacity building for alternative livelihood and VCF management. The meetings also helped identify training needs of community members on various issues. Accordingly, the NGO arranged training for project participants.

Arannayk Foundation supported NGO staff through providing training including on PRA techniques. The NGO staff assisted the communities arranging several training events and linking them with several service providers. Twenty three people of Kapropara and Korangpara received training on leadership and organizational development. The activities on awareness raising and alternative livelihood programs are summarized in the Table 1.

The VCF members were able to make decisions for the wellbeing of the community forest. Six people from Kapropara and Korangpara received training on grafting at the Bangladesh Agricultural Research Institute (BARI) training centre in Khagrachari. With respect to community-based savings and credit, the major task was collecting savings on a monthly basis, motivating community members on the value of personal savings, organizing meetings with the community, keeping and maintaining records of savings in the record book and depositing collected savings in the respective community bank accounts. The identified potential income-generating activities were tailoring, handicrafts, grafting, weaving, horticulture without accelerating soil erosion, rearing of livestock (poultry, pigs and cows), and cultivation of pumpkins and cucumbers.

A total of 20 women of Kapropara received training on weaving. A total of six people from both the villages received training on grafting at the BARI (Bangladesh Agricultural Research Institute) training centre. For sustainability of the program, the project provided them revolving funds worth tk 355,000 for Kapropara and tk 405,000 for Korangpara for the selected AIGAs (Table 1). The revolving fund was given after they had their own saving scheme. The fund was transferred directly to the community organization giving full authority to manage the fund directly by the community unlike typical microcredit program. The community had to develop guidelines for the fund management. The community members could draw a loan from the fund without interest but with a service charge of 5 % per annum. However, for taking a loan, they had to plant at least two saplings at their homesteads at their own cost. This ensured improvement of biodiversity at the homestead level. There was no weekly or monthly installment payment against the loan, but full repayment was required within 1 year or less. The term varied with the livelihood activity. For example, for vegetable cultivation at the homestead, the loan had to be repaid within 3 months, while for small business the borrower had to make monthly payments and all of the loan (not exceeding tk 10,000) had to be returned within 1 year.

Table 1 Intervention output on awareness raising and alternative livelihood programs in Bandarban, Bangladesh

Planned activity	Achievements
A community awareness-raising meeting on ecosystem, biodiversity	In each month, the VCF Committee organized community meetings to promote awareness on the importance of natural forest and biodiversity.
Flipchart development and printing for community awareness raising	A module and photo of the Flipchart were developed in due time resulting in a high quality print.
Training on organizational development, management and leadership	23 people of Kapropara and Korangpara have received training on leadership and development of organization. They were able to take decisions for the well being of the community Forest.
Technical training on forest conservation and natural resource management	Six people from Kapropara and Korangpara received training on grafting of horticultural species at Bangladesh Agricultural Research Institute (BARI) training centre, Khagrachari, Bangladesh.
Facilitating community-based savings and credit	The major task was facilitating community-based savings and credit arrangements, including collection of savings on a monthly basis, motivating community on the value of personal savings, organizing meetings with the community, maintaining records of savings in a register and depositing collected savings in the respective community bank account.
Facilitating a household income plan (HHIP) to conduct alternative income generating activities (AIGA)	The identified potential AIGAs were weaving, making clothes, handicrafts, grafting, mixed-fruit gardening including oranges, bananas, pineapples and papaya, and rearing of poultry, pigs and cows, and cultivation of pumpkins and cucumbers.
Providing training on AIGAs	A total 40 participants (20 from Kapropara and 20 from Korangpara) were trained in poultry and livestock rearing. A total of 20 women from Kapropara were trained in weaving.
	A total of 6 people from both the villages were trained in grafting at the BARI training centre.
Providing a revolving fund to project participants for AIGAs	The participants of Korangpara received tk 355,000 and of Korangpara tk 405,000 for several AIGAs.

Before the intervention, the average income per household was 32,193 time/year of which the maximum share of the income (86 %) was derived from juming[6] (38 %) and VCF (49 %) After the intervention, the income of the households increased by between 16 and 28 %. The income share of juming decreased from 38 to 27 %, and that from the VCF from 49 to 24 %. The alternative income generating sources increased the overall income of the households. The highest beneficial AIGA was fruit gardening outside the VCF followed by seedling production and weaving. As the income share from the VCF after the intervention decreased, there was reduced harvesting of forest products from the VCF and hence conservation benefits.

Although the indigenous groups are aware of the forest ecosystem services, the leadership and organizing capability along with the state-of-the-art knowledge on the forest utility—e.g. forests for climate change mitigation, and medicinal uses of the forest species—help community members to conserve the forests. The collective actions on forest resource management are mostly influenced by existing norms, social capital, extent of dependence on forests and effective leadership (Garbach et al. 2012; Paletto et al. 2012). Diverting the forest dependent livelihoods to other alternative livelihoods and securing the livelihoods of the forest dependent people have been proven to conserve forests in many parts of the world including Bangladesh (Khisa et al. 2006; Nath and Inoue 2009; Huang et al. 2012; Jashimuddin and Inoue 2012; Miah et al. 2012; Roy et al. 2012; Chen et al. 2013). Miah et al. (2012) reported that natural forest-sourced income constitutes the second largest share in total average household income next to the shifting cultivation income in Rangamati in the CHT. The higher dependence of the indigenous people on surrounding forests in the face of the severe deforestation in the CHT (Thapa and Rasul 2006) must accelerate the deforestation process and reduce livelihood security. The intervention in providing alternative livelihoods to the forest dependent peoples is, thereby, understood to enhance the health of the VCF.

Restoration of the Forest Resources

The documentation and publishing indigenous knowledge on forest restoration and conservation was completed in 2010. A total of 5,281 and 5,125 seedlings including fruit and timber species were planted in the Kapropara and in the Korangpara VCF, respectively. The indigenous knowledge on selection of species, seed collection, seed treatment, nursery technique, seedling preparation for plantation and preparation of planting sites in the VCF were prioritized in the plantation program. Studies conducted on indigenous knowledge regarding forest restoration and conservation, landscape development and forest restoration activities, and encouraging existing best practices on forest conservation are summarized in the Table 2.

Endangered indigenous tree species were planted in the degraded VCFs, including amloki, arjun, banspata, bohera, bon sonalu, chalta, chapalish, chatian, chickrasi, civit, kanjol, khoir, garjan, lohakat, motor koroi, palash, pitraj and sal. The bamboo species, baijja bansh and kali bansh were also planted in the VCF along

[6] Juming refers to shifting cultivation.

Table 2 Intervention output on restoration of the forest resources in Bandarban, Bangladesh

Planned activity	Achievement
Conducting studies to document and publish indigenous knowledge on restoration and conservation.	Documentation and publishing of indigenous knowledge on forest restoration and conservation were completed in 2010.
Landscape development and forest restoration activities (e.g. tree planting along water streams, degraded community reserve forests and other community land).	A total of 5,281 seedlings of fruit and timber species on the basis of indigenous knowledge were transplanted at Kapropara and 5,125 at Korangpara. Fruit and timber tree seedlings comprised of Garjan (*Dipterocarpus turbinatus*), Chapalish (*Artocarpus chaplasha*), Civit (*Swintonia floribunda*), Kanjol (*Bischofia javanica*), Motor koroi (*Albizia lucida*), Bohera (*Terminalia belerica*), Sal (*Shorea robusta*), Palash (*Butea monosperma*) Bon Sonalu (*Cassia fistula*), Khoir (*Acacia catechu*), Lohakat (*Xylia dulabriformis*), Chickrasi (*Chickrassia tabularis*), Pitraj (*Aphanamixis polystachya*), Chatian (*Alstonia scholaris*), Chalta (*Dillenia indica*), Amloki (*Emblica officinalis*), Kali bansh (*Bambusa arundinacea*), Baijja bansh (*Bambusa vulgaris*), Ramgoi-Am (*Mangifera indica*), Jalpai (*Elaecarpus robustus*), Lebu (*Citrus aruntifolia*), Peara (*Psidium guajava*), Kanthal (*Artocarpus heterophylus*), Banspata (*Podocarpus nerifolia*), Arjun (*Terminalia arjuna*).
	The VCF committee was reoriented to take care of the plantation and restoration activities.
Encouraging existing best practices through their utilization at the time of the project period.	The households in the communities raised seedlings surrounding their houses.
	Community forest conservation was one of their best practices among the nature-based activities. The interventions encouraged the community to conserve the VCF.

the water courses. The horticultural species—i.e. jalpai, kanthal, lebu, peara and ramgoi-am—were planted in the plantation sites outside of the VCF. The average survival rate of the seedlings was 78 %. The households in the communities raised seedlings near their houses. The VCF committees took care of the silviculture and restoration activities.

The baseline survey in 2009 identified a total of 63 distinct tree species in the VCF of Kapropara and 56 in Korangpara. Although the report of the baseline survey did not quantify tree species diversity by indices, few native species were present. The natural regeneration status was reportedly satisfactory but not the recruitment of seedlings. Through the intervention, the planting of vulnerable and endangered native tree species in the degraded VCF was successful. Before the intervention, the community members had been hunting wild animals including squirrel, wild boar, and deer without considering sustainability. The intervention reconstructed their perceptions on the frequency of hunting and type of game animals can be hunted. The training supported the villagers identifying rare game species and led to reduced hunting of these species and hunting relatively abundant game species only the subsistence food, not for sport.

The status of the species planted in the VCF can be corroborated by the study of Jashimuddin and Inoue (2012). The need for restoration of forests by reforestation with native tree species has been identified by Hall et al. (2011).

Developing Institutional Mechanisms for Conservation and Sustainability of the VCF

One group from each of the villages was formed which included at least one representative from each household. Two female representatives were compulsory in each group. The executive committee was formed through discussion with the members of the group. A total of nine members in each of the executive committee (EC) for each of the villages were confirmed by the discussion. Hence, there was no conflict found between the past customary committee and the present executive committee. While there was no written constitution in the customary group, the intervention had initiated the written constitution of the group. To use the revolving funds, a bank account was opened by each of the EC for which there was a saving levy of tk 20/member/month. A monthly meeting of the group was introduced by the intervention. Recording the resolutions of the meeting was a tough job for the group members because of the lack of technical knowledge. However, the intervention firstly recorded the meeting discussions and then facilitated writing the resolutions with encouragement for regular reporting. Women were encouraged to participate at every stage of forest conservation and restoration. In the customary management system, there was no provision for involvement of women in the management of VCF (Haque 2000), while the intervention ensured womens' participation in forest management. Westermann et al. (2005) concluded that the capacity for self-sustaining collective action for natural resource management increases with women's presence. Optimal common property institutions or regimes have played socially beneficial roles in natural resources management from time immemorial (Ciriacy-Wantrup and Bishop 1975), which confirms the importance of institutions for the sustainability of VCFs. However, these traditional institutions have been weakened due to inadequate consideration on traditional resource management systems or the socio-cultural life of the common property consumers. Forest policies in increasing government revenues or massive extraction of major forest resources, nationalization of forests, encouraging sedentary agriculture, privatization for long-term horticulture or tree planting, and migration of people from the plains to the CHT sponsored by the government and other development programs have weakened the traditional institutions (Jashimuddin and Inoue 2012).

Overall Impacts of the Intervention

The intervention was found useful to increase forest cover and forest natural regeneration. The local people reduced their jum (shifting cultivation) activities in the VCF. The community confirmed that due to the intervention, a few tree species had been rehabilitated in the VCF which were not found in recent years. Increasing forest cover and forest natural regeneration might be possible because of reduced logging pressure on the forests. The community also observed that the water flow in

streams is gradually increasing due to improved vegetation cover. A baseline survey report under this intervention acted as a guideline to conduct restoration and income-generation activities. The VCF committee formed by the intervention created a mixed fruit garden outside of the VCF and managed it based on the rules preset by the intervention. Nursery establishment by five members in Kapropara and eight members in Korangpara facilitated the planting activities outside the VCF. The interventions ensured banning the commercial harvesting of herbs and shrubs from both of the VCFs. A monthly meeting resolution document, cash and ledger book, and mobilization through various awareness programs confirmed the institutional development of the Mro communities towards forest conservation. The awareness programs and alternative livelihood schemes encouraged the group members in both villages to conserve their VCFs with their best practices.

The intervention supported establishing a water Gravitational Flow System (GFS) to provide drinking water to the villagers at their homes and water for cultivating vegetables around their homesteads. Perceptions of the community members on the commercial use of the plants were also changed by the intervention. A new marketing knowledge provoked by training led to introduction of new commercially important plant species (e.g. Chui Jhal, Chalta and Amlaki) and set up new marketing initiatives for sustainability of income.

The impacts show a high potential for increasing the capacity of the villagers to restore VCF. However, the continued health of the VCFs is dependent on some important factors, including sustainability of the institutional support, activities altering the economic behaviour of the villagers by providing alternative livelihood programs, and activities enforcing the conservation wisdom of the villagers (Jashimuddin and Inoue 2012). So, sustainability of restoring and conserving the VCF depends on at least the above factors. It is difficult to predict how long the institutional support will be needed to make the changes permanent.

Weakness that Need to be Overcome

The participants expressed the opinion that they needed more support to identify alternative livelihood activities. More training workshops are needed to reinforce the intervention project activities. The revolving funds provided to the VCF committee were deemed to be insufficient by the participants, so more funds are needed by the VCF committees for their alternative livelihood activities. The uncertain VCF land ownership raised concern about the sustainability of achievements. Some support for registration of VCF land is necessary. However, the VCF land property rights should be within the common property regime. The VCF land should be legally defined as a communal resource, but with the roles and regulations of this common property resource monitored by the government authority.

Conclusions and Policy Implications

The project has had a major impact on restoring and conserving the VCF and the surroundings of the Mro community. The impacts show a high potential of

sustainability of the capacity achieved by this project, 'Indigenous community based sustainable management of Chimbuk Hill forest in Bandarban hill district'. However, the ecosystem health of these VCFs is dependent on several factors, including sustainability of the institutional support, activities altering the economic behaviour of the participants, and activities reinforcing the conservation wisdom of the participants. It is difficult to conclude how long the institutional support will be needed to make the changes permanent.

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